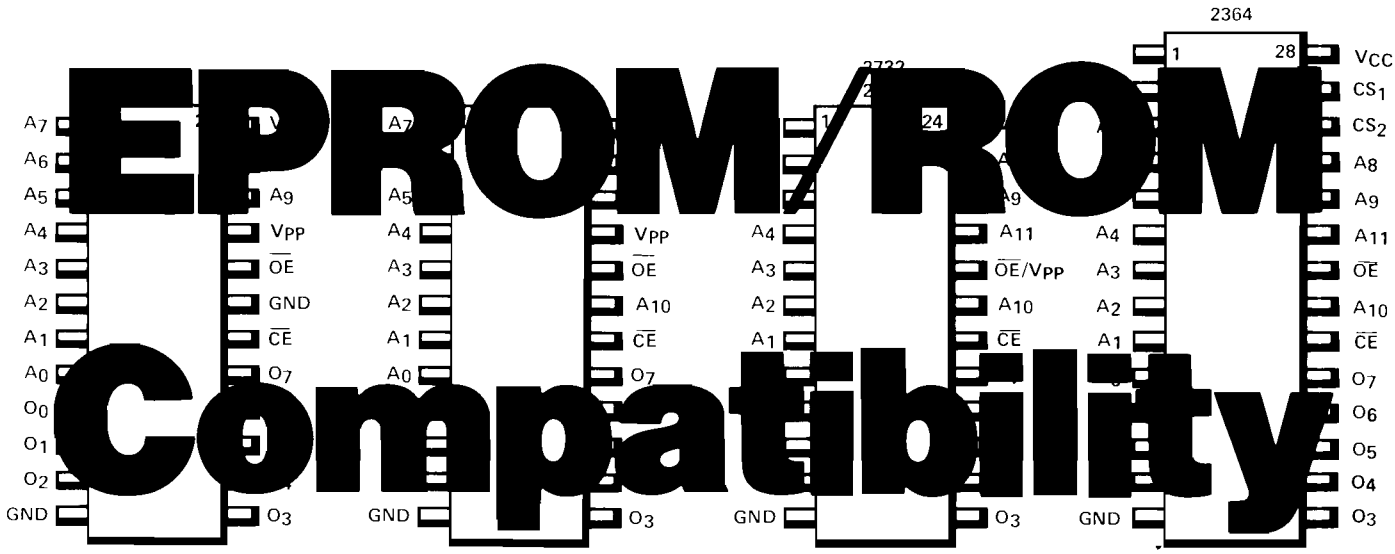
intel®

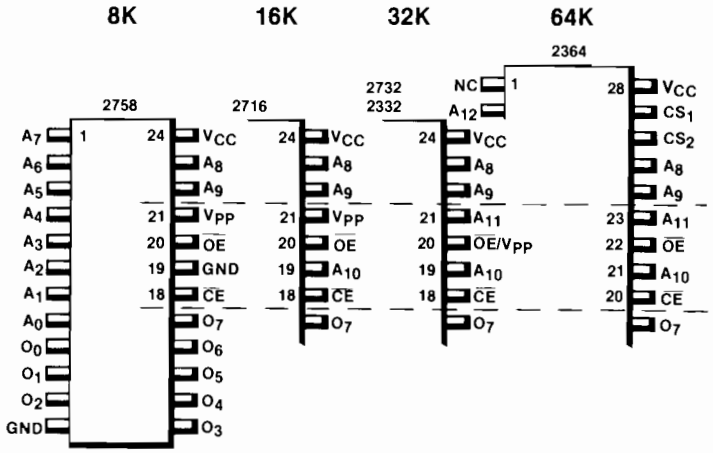
EPROM/ROM Compatibility



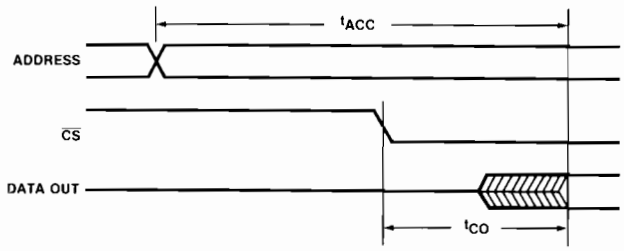
JANUARY 1978

EPROM/ROM Compatibility

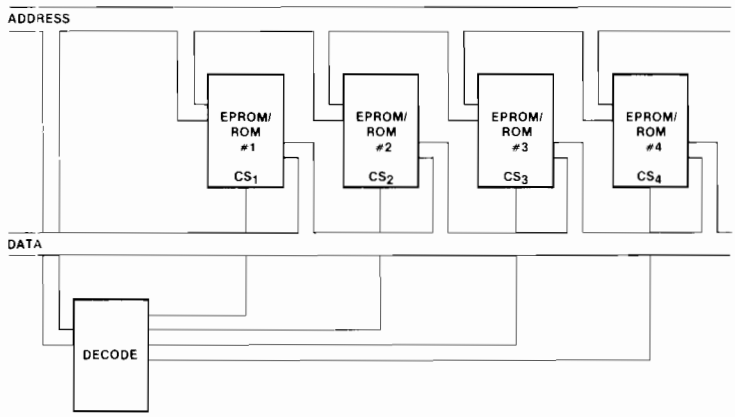
EPROM/ROM COMPATIBLE FAMILY



- Everything's the same except for 4 pins.
- This presentation discusses the techniques required to utilize any member of this family in the same DIP site.
- Note that the 2758/2716 nomenclature has been changed to reflect actual function usage.

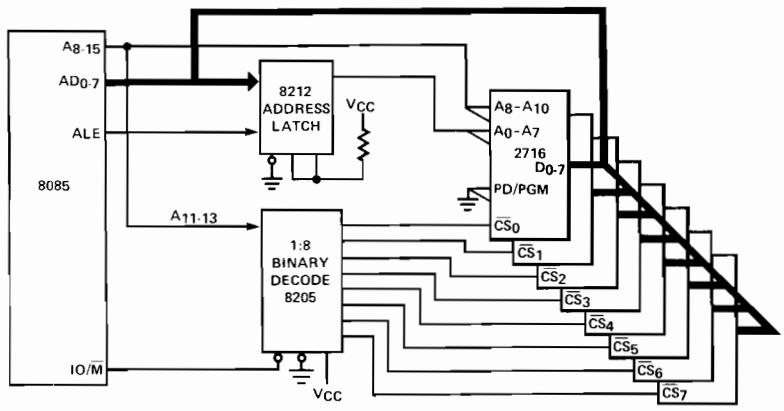


- Traditional decode scheme utilizes time difference between t_{ACC} and t_{CO} to allow time for decode function.

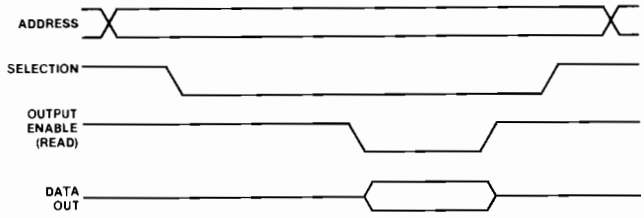


- Inadvertant address changes can cause multiple device selection.
- Most microprocessors have some states where addresses are undefined: If this occurs during memory cycle, bus contention results.

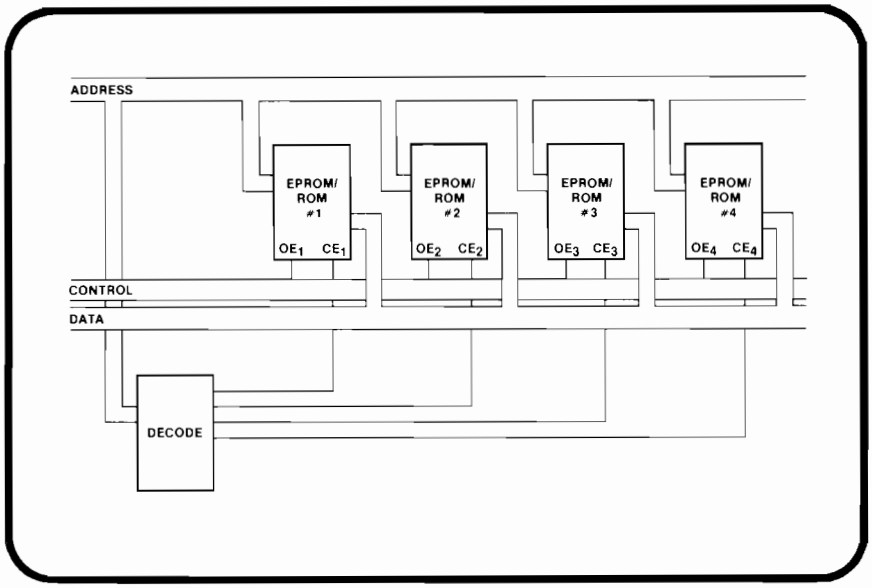
TRADITIONAL 16K EPROM SYSTEM



- Actual system showing traditional decode implementation.
- Traditional scheme is not compatible with new high performance microprocessors.
- A new decode scheme is required.
- Note that PD/PGM is connected to GND and $\overline{CS}$ is used to control selection.

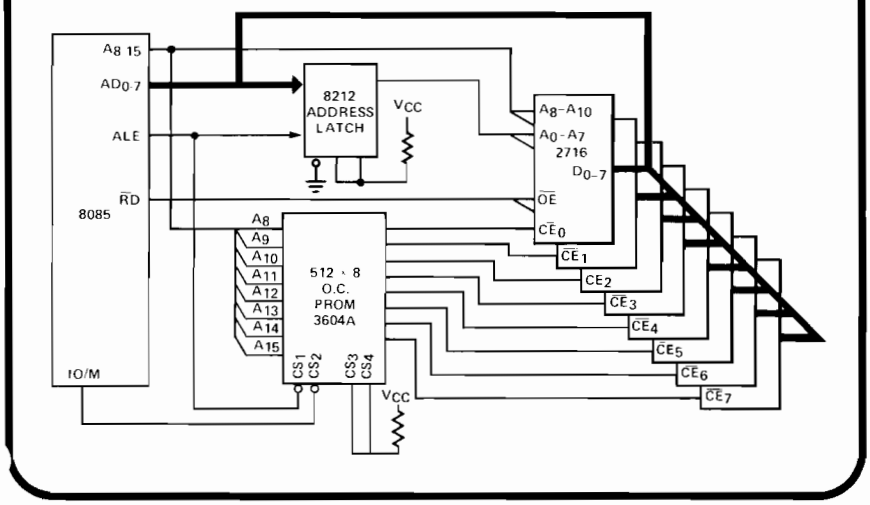


- New decode scheme requires separation of device selection and output control (OE).
- Address bus used as before to accomplish device selection.
- Memory device outputs enabled only when required.



- Control function now completely independent from device selection process.

CORRECT 16K EPROM SYSTEM



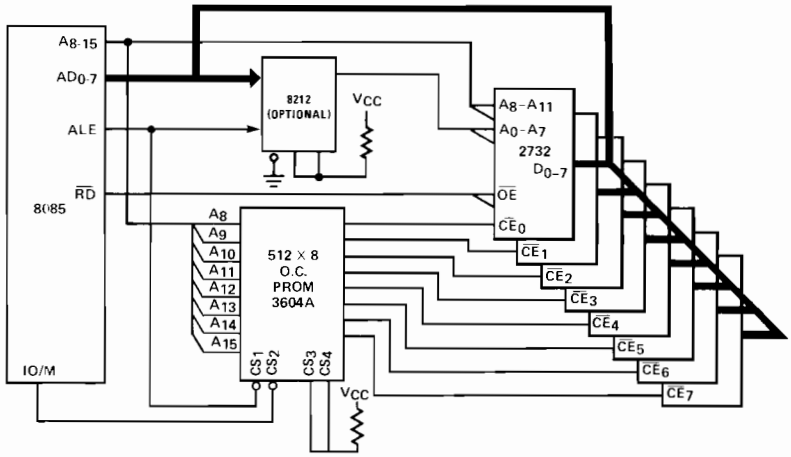
- Actual system showing new decode scheme.
- Note that the 2716 has not changed, only the function names for Pin 18 and Pin 20.
- All future references to the 2716 will reflect this new nomenclature. Pin 18 is now $\overline{CE}$, Pin 20 is now $\overline{OE}$.
- This scheme accomplished by using $\overline{CE}$ (PD) as the primary decode. $\overline{OE}$ (CS) is now controlled by previously unused signal. RD now controls data on and off the bus by way of $\overline{OE}$.
- A selected 2716 is available for systems which require $\overline{CE}$ access of less than 450 ns for decode network operation.
- The use of a PROM as a decoder allows for:
  a) ALE is required for Edge Enabled devices (32K and 64K), and is optional for 2716.
  b) Compatibility with upward (and downward) memory expansion.
  c) Easy assignment of ROM memory modules, compatible with PL/M modular software concepts.

SYSTEM UPGRADE TO 32K EPROM/ROM

	2716	2332/2732	
PIN 21	V_{PP} (V_{CC})	A_{11}	COMMON MEMORY ARRAY CONNECTION
PIN 20	$\overline{OE}$	$\overline{OE}$	NO CHANGE
PIN 19	A_{10}	A_{10}	NO CHANGE
PIN 18	$\overline{CE}$	CE	AUTOMATIC POWER DOWN
8212	REQUIRED	OPTIONAL	EDGE ENABLED DEVICES HAVE ON CHIP LATCHES

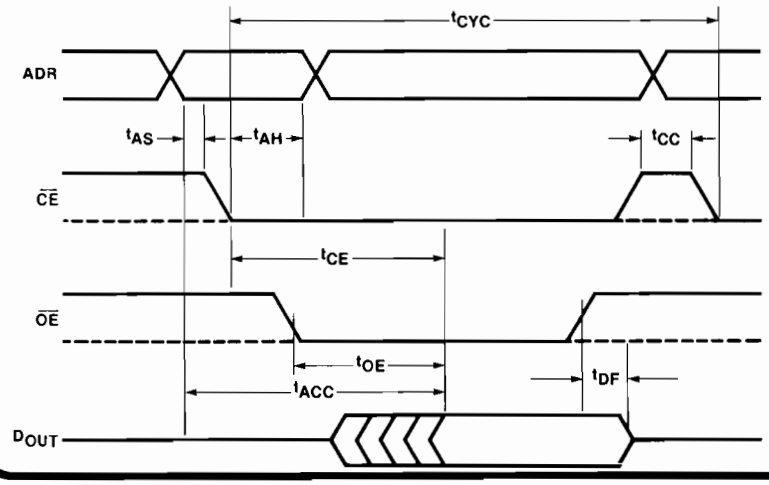
- 2732/2332 are plug-in replacements for 2716.
- One board level jumper on Pin 21 required to select either V_{PP} (V_{CC}) or A_{11}.
- Pins 18, 19 and 20 have maintained same function as on 2716.
- Note that V_{PP} is equal to V_{CC} for read (not programming) function of 2716.

32K EPROM SYSTEM



- Connections the same as for 16K EPROM.
- By planning ahead, ALE was used as condition for decode, thus assuring that t_{CC} time requirement will be met.

EDGE ENABLED PRODUCT WAVEFORMS



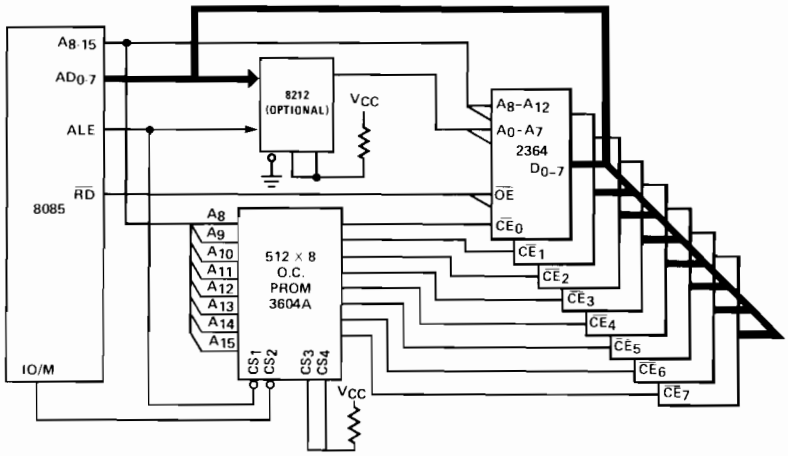
- New Intel ROMs/EPROMs use Edge Enabled concept.
- Cycle time does not equal access time.
- Internally, Edge Enabled devices have completely static arrays with some clocked peripheral circuits.
- CE may remain high or low indefinitely — however, it must be high a minimum of 100 ns (t_{CC}) prior to a high to low edge transition.

SYSTEM UPGRADE TO 64K ROM

2332/2732	2364	
24-PIN	28-PIN	PLUG-IN — NO JUMPERS LOWER 24 PINS ARE IDENTICAL
V_{CC}	CS_2	CODE THIS CS_2 ACTIVE HIGH

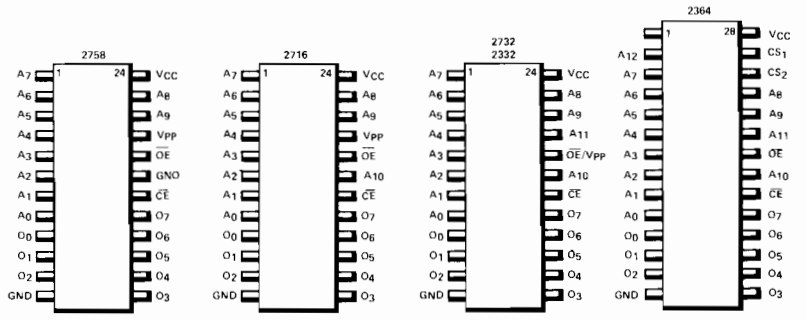
- Remember to code CS_2 active high.
- Board can be laid out for 28-pin device initially and thereby allow total flexibility from 8K through 64K.

64K ROM SYSTEM

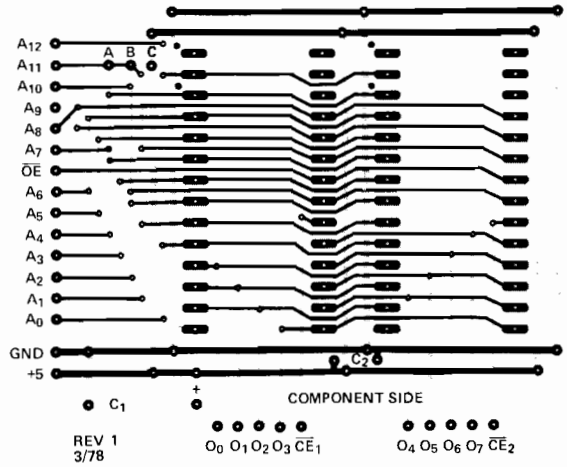


- As with 32K and 16K, all connections are the same at the system level, only the EPROM/-ROM changes.
- As in the 32K system, the 8212 address latch is optional for Edge Enabled devices.

EPROM/ROM COMPATIBLE FAMILY



- The entire family.
- By laying out a PC board now for 28 pin sites, and allowing for jumper selection at A_{11}, modularity from 1K byte through 8K bytes can be achieved, on the same card, with either ROM or EPROM.



- Example of printed circuit layout to accom, modate entire compatible family.
- Provision for A_{11}/V_{CC} jumper on pin 21 shown at A, B and C.

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